



Cal-IPC News

Protecting California's Natural Areas from Wildland Weeds

Newsletter of the California Invasive Plant Council

Going to great lengths



Treating fennel on San Clemente Island. Winner of the 2015 Photo Contest, by Aaron Echols, Channel Islands Restoration

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*Protecting California's lands and waters
from invasive plants*

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From the Director's Desk

It's the little things...

By Executive Director Doug Johnson

Sometimes small changes can result in significant progress. A new sentence in a planning document may provide a stronger foundation for programmatic policies. Here are a few small improvements made recently that hold promise for helping our work in the future.

The California Dept. of Water Resources recently updated its model ordinance for Water Efficient Landscaping. This serves as a template for local jurisdictions to use in setting local policy. Now included under landscape design: "The use of invasive plant species, such as those listed by the California Invasive Plant Council, is strongly discouraged." We have received calls from municipalities wanting guidance on using our list, and we are working with Alameda County StopWaste on developing guidelines for using our list in making appropriate site-specific landscaping decisions.

Along the same lines, California is updating its General Plan Guidelines for communities. Cal-IPC Member Paul Minault is following the process and providing formal comment on ways to include invasive plant management, for instance in the section on protecting open space for habitat and conservation.

The National Green Building Standard is in revision, including a brief section on non-invasive landscaping. A project loses significant points if it cannot claim to be using non-invasive vegetation (and a project can earn extra points for removing invasives found on site). New draft language clarifies that invasive plant lists are not limited to those from a government agency. This elevates the potential for using other science-based lists from organizations like Cal-IPC.

California recently completed the 2015 Update to its Wildlife Action Plan. Tabular presentation of 29 ecological pressures considered in the statewide stakeholder process show that invasive species are the top ecological pressure on wildlife by far, with 50% more strategic actions proposed than the next runner up ("livestock, farming, and ranching"). Though the plan does not call this out explicitly in the text, the evidence is there, and groups dedicated to protecting wildlife can't miss the significance.

Only time will tell, but with luck these small bits of progress will add up to big progress in the future.



California Water Efficient Landscaping model ordinance:
www.water.ca.gov/wateruseefficiency/landscapeordnance

California General Plan Guidelines: www.opr.ca.gov/s_generalplanguidelines.php

National Green Building Standard: www.homeinnovation.com/ngbs

California Wildlife Action Plan: www.wildlife.ca.gov/SWAP

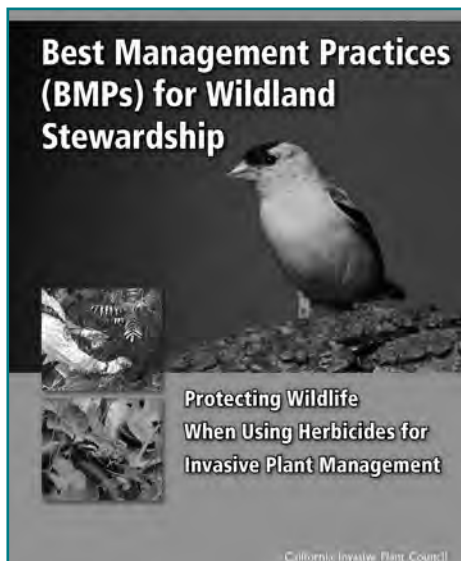
Cal-IPC Updates

Desktop WHIPPET. The WHIPPET tool helps land managers prioritize populations of invasive plants for eradication. Last year an online version was released by Cal-IPC. Gina Darin of the CA Dept. of Water Resources has completed a new-and-improved version of the desktop version that you can use with your own ArcGIS for greater ability to customize the analysis. Download from whippet.cal-ipc.org.

Herbicide BMPs. Our manual of “Best Management Practices for Wildland Stewardship: Protecting Wildlife When Using Herbicides for Invasive Plant Management” includes practices to reduce risks to wildlife. Toxicology charts show risks of commonly used herbicides to different type of wildlife. Download from www.cal-ipc.org.

Regional proposals. We worked with partners in three more regions—South Central Coast (Santa Barbara and San Luis Obispo counties), North Central (Shasta, Siskiyou, and Trinity counties), and San Mateo County (for Canary Island St. Johnswort)—to submit proposals to the California Wildlife Conservation Board to eradicate high-priority invasive plant species.

Getting around. Cal-IPC has presented on our work at the State of the San Francisco Estuary conference in Oakland, the Southwest Climate Summit in Sacramento, and at the international



Wildland Weed News

EMAPi conference in Hawai'i (see p. 13).

Upcoming project. We received a two-year grant from the National Fish and Wildlife Foundation to remove Algerian sea lavender from marshes around San Francisco Bay and to develop an index for ranking the level of invasive plant threat to each salt marsh.

Other News

Using livestock to control weeds.

University of Nevada Cooperative Extension has designed a handbook for using livestock for noxious weed control in nine Western states. The guide includes detailed information on 26 weed species and is available as a free download. www.webpages.uidaho.edu/rx-grazing/Guidelines.htm

Educational books. *Teaching About Invasive Species* is designed for youth educators, with 11 units and 20 ready-to-use activities on invasive species (www.greenteacher.com). *Outlaw Weeds of the West* has descriptions of invasive plants in western states, plus cartoons, photos, and botanical drawings to capture children's interest, ages 8-12. www.mountain-press.com.

State Wildlife Action Plan released. The 2015 revision of California's Plan is now available. The SWAP describes challenges faced by wildlife and proposes actions for each eco-region of California. Invasive species are listed more often than any other threat. Cal-IPC wrote the appendix on Invasive Species. www.wildlife.ca.gov/SWAP

SF Bay Upland Habitat Goals. The regional goals document has been updated. Cal-IPC contributed to chapters on “Connections to the Watersheds” and Wildlife. baylandsgoals.org/science-update-2015/

Weeds hurt sage grouse. The Western Association of Fish & Wildlife Agencies produced a report on Invasive Plant Management and Greater Sage-Grouse Conservation as part of the run-up to the recent decision to not list the Great Basin



Wall of Arundo. Second place in 2015 Photo Contest, by Sloane Seferyn, UltaSystems Environmental, Inc.

species as endangered. www.doi.gov

CISM closes. After 15 years as a successful western regional hub for invasive species expertise and interagency project collaboration, the Center for Invasive Species Management closed its doors June 30 due to loss of funding. Their website serves as an archive of CISM's projects and resources. www.weedcenter.org

Keep current!

Remember to check your Cal-IPC membership status on the mailing label of this newsletter. Keep your membership current so you don't miss out on any of the new happenings in the field. You can renew online or with the enclosed envelope. Thank you for your membership and the support it provides for our work!

Early Detection in Bay Area National Parks

By Eric Wrubel, San Francisco Bay Area National Parks

The Invasive Plant Species Early Detection (ISED) program of the San Francisco Bay Area National Parks Network (SFAN) was developed to locate new infestations of invasive plants before they become widely established in network parks. Prevention is the first line of defense against biological invasions. However, when preventative measures are not successful, early detection and rapid response (EDRR) is the most efficient and cost effective strategy to reduce the harmful impacts of invasive species.

The SFAN parks include Golden Gate National Recreation Area, John Muir National Historic Site, Pinnacles National Monument, and Point Reyes National Seashore. These protected areas are critical for conservation of the endemic flora and fauna of Central California, a global biodiversity hotspot. Due to their close proximity to major metropolitan areas, SFAN parks are also vulnerable to biological invasions through numerous pathways, and are heavily impacted by invasive plants, with over 90 invasive species under active management. The SFAN Inventory and Monitoring Program has published and implemented a detailed early detection protocol to promote EDRR in the parks (Williams et al. 2009).

Early detection protocol

The following objectives form the framework of the ISED protocol:

1. Develop a priority list of target invasive plant species that are

uncommon in SFAN parks, or are located in adjacent lands, that would cause ecological or economic impacts

A prioritization matrix was developed to rank species for early detection, based on current knowledge. Species ranked high if any of the following were true:

- they are invasive in California
- they are ecosystem alterers (effecting major changes to chemical or physical processes in ecosystems)
- they endanger rare plants
- their known acreage in the parks was low, and their feasibility of control was high.

Surveys are conducted on foot by ISED teams of two to four trained staff members, interns, and volunteers. The protocol focuses on roads and trails because

they are primary pathways for the establishment and spread of invasive plants. The highest priority target species are mapped with the greatest level of detail, while medium and low priority species are mapped with decreasing levels of detail. ISED teams also implement manual treatments to remove small populations of high priority species, when treatment time will not exceed 10% of survey hours.

Outreach and collaboration

The ISED program was designed as an early warning system that accommodates information inputs from a diverse network of observers. Detailed data from protocol-level surveys document abundance or absence of target species in survey areas. Opportunistic observations are also encouraged in order to increase the probability of detecting uncommon invasive plants at an early stage of



Early detection intern Lindsay Ringer removes foxglove (*Digitalis purpurea*) at Rodeo Lagoon in the Golden Gate National Recreation Area. Photo by Kevin Sherrill.

- if they were to become established.
2. Rank park subwatersheds by resource value and risk of invasion. Survey all roads and trails in each park within a five year survey cycle, with top priority subwatersheds surveyed annually, moderate priority surveyed biennially, and low priority surveyed once within five years. Assess and map target invasive plant populations detected during surveys, and communicate findings quickly to park vegetation managers.
3. Evaluate data after each five year survey cycle to determine the distribution of target invasive species along roads and trails in each park, and identify possible management actions to prevent new infestations. Use the data to refine subwatershed rankings for search priority and timing.

establishment. We receive early detection reports from volunteers, park staff, park partners, weed management areas, and local resource management agencies. Although these reports are not used in data analysis, they often alert us to newly introduced species, or new locations of target species. The ISED program provides plant identification products and services, and conducts formal and informal trainings, to increase awareness of new invaders in network parks.

Reliance on data collected by volunteers has evolved over the course of the program. Initially, volunteers from the general public were recruited and trained, in the hope that they would become advanced observers capable of conducting independent protocol-level surveys. However, low recruitment and retention rates, and marginal data quality led us

ISED program produces a monthly email newsletter, Early Detection News, documenting significant new occurrences and survey results, and publishes annual reports on the NPS Natural Resources Publication Management website (www.nature.nps.gov/publications/nrpm). The ISED program also collaborates with regional and statewide organizations such as the Bay Area Early Detection Network, county-based Weed Management Areas, California State Parks, and Cal-IPC.

Data, results and future directions

Since its inception, the ISED program has been involved in the development of innovative tools to collect and share invasive plant data. The GeoWeed geospatial database and mapping system, a modification of The Nature Conservancy's Weed Information Management System (WIMS), was developed in partnership

with the Sonoma Ecology Center in 2007. In 2012 the SFAN Inventory and Monitoring Program partnered with Calflora and a coalition of resource management agencies to create the Weed Manager system, which was

launched in 2015. Weed Manager is hosted on Calflora.org, the most comprehensive statewide repository for information on native and naturalized plants in California. Based in part on the GeoWeed data model, Weed Manager tracks invasive plant occurrences, assessments and treatments (OATs) through time. Mobile platforms such as tablets and smartphones are utilized for mapping and data collection, and web-based applications are

used for data import, export, editing, and analysis. Weed Manager allows unprecedented opportunities for data sharing between users, while also providing robust privacy tools, making it an ideal platform for storing and disseminating early detection data.

The ISED program has mapped over 8,000 infestations of target invasive plant species since 2008, and removed over 1,000 of these infestations. ISED has also discovered over 50 non-native species not previously known to occur in SFAN parks. Network parks actively integrate ISED data into invasive plant management and planning, which has led to the initiation of control efforts for species in the early stages of invasion, such as stinkwort (*Dittrichia graveolens*), mayten (*Maytenus boaria*), Andean tussockgrass (*Stipa manicata*), and others.

Evaluation of data from the first five-year survey cycle suggests refinements for search priority and timing. The current detection rate of approximately 1,500 new patches per year exceeds the response capabilities of park programs. The survey frequency may now be reduced to come into balance with treatment rates, since we have comprehensive distribution information from over five years of high-frequency surveys. We also hope to improve the linkage of early detection data with treatment data from other programs to better assess the effectiveness of EDRR as a unified management strategy.

Resources

Williams, A. E., S. O'Neil, E. Speith, and J. Rodgers. 2009. Early detection of invasive plant species in the San Francisco Bay Area Network: A volunteer-based approach. Natural Resource Report NPS/SFAN/NRR—2009/136. National Park Service, Fort Collins, Colorado.

Newsletters available at: www.sfnps.org/weed_watchers/newsletters

To subscribe to Early Detection News, email eric_wrubel@nps.gov

Calflora Weed Manager: www.calflora.org/entry/weed-mgr.html



Early detection interns Kris Daum and Raphaella Floreani Buzbee remove kangaroo apple (*Solanum aviculare*) at Point Reyes National Seashore. Photo by Nick Stevenson, NPS.

to abandon this approach. Reportable data is collected by staff and interns, who are generally able to invest more time to develop the skills necessary to identify and map target species which are often cryptic.

Monthly reporting and communication with a network of weed workers creates an information feedback loop that enhances the effectiveness of early detection efforts, and increases awareness of new invasive species threats. The

2015 Cal-IPC Symposium



Photo Drew Kerr

...in sunny San Diego!

Over three hundred land managers, researchers and volunteers came to our 24th annual event, including attendees from Baja California, Italy, France, and Oman. This year's Symposium featured special sessions on how invasive plant management can be incorporated into habitat conservation planning. A closing panel on the future of invasive plant management stimulated discussion on research needs, new technology, cross-border collaboration, and finding new funding. Presentations are posted at: www.cal-ipc.org/symposia/archive

Congratulations to this year's award winners!

Jake Sigg Award for Vision and Service: Cindy Burrascano, San Diego CNPS [top right, with Doug Johnson and Mike Kelly]

Golden Weed Wrench for Land Manager of the Year: Bill Neill, Riparian Repairs [middle right, with Doug Johnson and Jason Casanova]

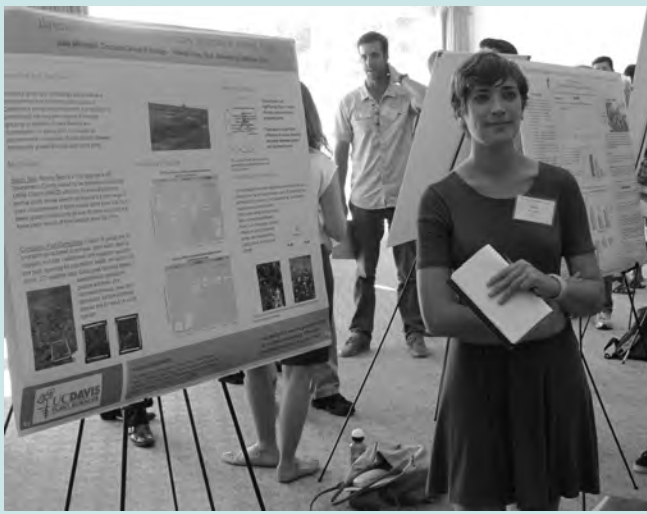
Organization of the Year: Urban Corps of San Diego County [bottom left, Doug Johnson; Robert Chavez; corpsmembers Tanya Sanchez, William Beaven, and Ismael Solis; and Cal-IPC board member Dan Knapp (second from right)].

Weedzilla for National Park Service Land Manager of the Year: Clark Cowan, Channel Islands National Park [bottom right, with Bobbi Simpson and Irina Irvine]

Student Papers: 1st Justin Valliere, UC Riverside; 2nd Ellen Esch, UC San Diego; 3rd Cody Ender, Sonoma State University

Student Posters: 1st Kerstin Kalchmayr, San Francisco State University; 2nd Annika Rose-Person, UC Santa Cruz; 3rd Julia Michaels, UC Davis





The poster session featured 23 presenters. Here, Julia Michaels of UC Davis talks about her work measuring impacts of grazing on vernal pools. *Photo JP Marie.*



Trish Smith of The Nature Conservancy leads a panel of experts on habitat conservation planning in discussion about how regional plans can incorporate invasive plant management to protect habitat for listed species. *Photo Drew Kerr.*



Field trips took attendees to the Cleveland National Forest (not pictured), Rancho Jamul Ecological Reserve (left), and Black Mountain Open Space for a drone mapping demonstration by The Nature Conservancy's Brian Cohen (right). *Photos Dana Morawitz, Elizabeth Brusati*



The raffle and social hour provided time to relax with fellow attendees and support Cal-IPC's work. *Photo JP Marie.*



Mickie embraces *Bromus carinatus* and promises everything will be OK. Photo Contest 3rd Place, Melanie Dickinson, Younger Lagoon Reserve.

Mark your calendars for Cal-IPC's 25th Symposium, Tenaya Lodge, Yosemite, Nov. 2-5, 2016!

Is glyphosate a carcinogen?

(And is that the most important question for land managers to ask?)

By Joel Trumbo, California Department of Fish and Wildlife

This past May, the International Agency for Research on Cancer (IARC) made a determination that glyphosate—the active ingredient in Roundup® and other similar herbicide products—is probably a human carcinogen. IARC placed the herbicide in its 2A “probable human carcinogen” group along with other synthetic compounds such as the insecticide malathion (and other risks such as UV light and red meat). IARC’s determination was based on “limited evidence of carcinogenicity in humans and sufficient evidence of carcinogenicity in experimental animals.”

In response to the IARC decision, Cal EPA’s Office of Environmental Health Hazard Assessment (OEHHA) published a notice announcing its intent to list the herbicide as a carcinogen under the Safe Drinking Water and Toxic Enforcement Act of 1986 (Prop 65). The comment period for this decision closed this past October 20. OEHHA’s decision is forthcoming.

Reaction to the IARC determination and the potential Prop 65 listing was significant. People on both sides of the fence—pesticide advocates and pesticide opponents—were asking, Should we stop using glyphosate? In order to answer this question, it’s valuable to consider the following.

First, IARC’s determination of “limited evidence” of human carcinogenicity was based on information provided by epidemiological studies. These studies used questionnaires given to farmers and their families in North America and Europe to look for a link between chemical exposure and cancer. Epidemiological studies can reveal if there’s a positive association, or correlation, between exposure to the agent and cancer, but they cannot be used to determine the cause of the cancers. They also cannot completely rule out other explanations such as chance



Prop 65 Warning Sign: One important disadvantage of this sign is that it alerts one to the presence of a carcinogen or reproductive toxicant, but it provides no information on the level of exposure that would actually put you at risk.

or bias. Additionally, these studies have limitations such as the accuracy of self-reported information and the effect that exposure to other substances, including other pesticides, might have on cancer incidence. In short, these types of studies can identify a correlation, but they don’t establish a direct link or causality.

IARC’s determination was also based on “sufficient evidence” of carcinogenicity in lab animals, but not all of the studies in the assessment revealed a carcinogenic link. Only four of the seven chronic feeding studies used in the IARC assessment found a relationship between glyphosate and cancer. One of those studies—a 24-month feeding study where kidney tumors in mice were initially determined to be glyphosate-related—was re-evaluated by the US EPA in 1991 and

the judgment of the reviewing pathologists was that the kidney tumors were not treatment-related. The IARC pathologists, however, did not agree with the US EPA’s conclusion and included the study with its original conclusions in their 2015 assessment.

Toxicological risks must be assessed by looking not only at toxicity—in this case carcinogenicity—but also at exposure. This assessment cannot be made solely by asking the question, Is the substance a carcinogen? While several of the animal feeding studies in the IARC assessment demonstrated a positive relationship between glyphosate exposure and cancer, the concentrations in those tests were higher than what an herbicide applicator would experience in the field. Even if one ignores the fact that oral exposures are highly improbable for applicators, the dosages themselves are atypical for actual herbicide use scenarios. Depending on the study that’s examined, the tumor-causing dosages were from 30 to 30,000 ppm. Using these dosages, a man weighing 175 pounds would have to drink more than a quarter tablespoon to slightly more than 1 gallon of herbicide every day for 2 years to have an exposure that’s equivalent to that of the lab animals’.

As more research is done, it’s a certainty that many more substances, some of which we are commonly exposed to in everyday life, will be identified as carcinogens. The recent inclusion of bacon and other processed meats on IARC’s Group I list for known human carcinogens is evidence of this. When considering these types of determinations, it’s critical to remember that the amount and duration of exposure must also be considered, not just the fact that the chemical made it “on the list.” Perhaps the best advice regarding this fact can be found on the

...continued page 9

“Do No Harm” to avoid introducing pests in restoration

By Elise Gornish, UC Davis

Ecological restoration is integral for the reestablishment of functional plant communities in degraded systems across California. Restoration often involves the transplanting of nursery stock or field-collected plants into damaged habitat, and this movement of plant materials can sometimes result in unintended transfer of plant pathogens, pests and diseases into previously uninfected habitats. As you are probably aware, this has become a critical issue in the wake of several inadvertent introductions of *Phytophthora ramorum*, the pathogen causing Sudden Oak Death, through contaminated native plant stock from nurseries.

To address this unintended consequence of ecological restoration activities, UC Cooperative Extension Specialists Elise Gornish and Travis Bean organized the first annual Do No Harm workshop (<http://donoharm.ucdavis.edu>), held at the UC Palm Desert campus on Nov. 5, 2015. The day-long workshop featured a series of poster and oral presentations that focused on identifying, preventing and mitigating the spread of pests, plant pathogens and diseases through ecological restoration activities in California. The event was extremely successful, with over 70 attendees affiliated with a diversity of groups, including federal agencies,

academic institutions, native plant nurseries, and restoration practitioner organizations.

The dynamic group of presenters featured researchers from all over the state, and presentations covered a range of topics, including: historical perspectives on California restoration; soil biology and restoration; plant and pest invasion in California; *Phytophthora* in native areas; and mitigating movement of *Phytophthora* in native nurseries. Most of the presentations will be available on the workshop website in the near future. In addition to formal presentations, the workshop provided opportunities for networking and collaboration initiation through discussion panels and coffee breaks. The workshop closed with all attendees completing a survey that was designed to collect information about unintended consequences of activities associated with ecological restoration.

Many diverse sponsors helped make the workshop possible: UC Riverside and UC Davis, UC Division of Agriculture and Natural Resources, the Center for Conservation Biology, the Watershed Nursery, the Riverside-Corona Resource Conservation District, the California Invasive Plant Council, the UC Weed Research & Information Center, and the

The CNPS Santa Clara Valley Chapter has posted several YouTube videos on avoiding the spread of *Phytophthora*:

www.youtube.com/watch?v=CuPYc9lcCcc

www.youtube.com/watch?v=oKEQqDBU3vw

www.youtube.com/watch?v=IMw4NpDgCTs

University of Wisconsin press. We look forward to organizing the second annual Do No Harm workshop, which will focus on addressing another aspect of ecological restoration in California. The workshop is tentatively scheduled for November 2016 in Davis. Stay tuned for an announcement in *Cal-IPC News*.

...glyphosate continued

website of the American Cancer Society: “Even if a substance or exposure is known or suspected to cause cancer, this does not necessarily mean that it can or should be avoided at all costs. For example, estrogen is a known carcinogen that occurs naturally in the body. Exposure to ultraviolet (UV) radiation from sunlight is also known to cause cancer, but it’s not practical (or advisable) to completely avoid the sun.”

As to the question, should we stop

using glyphosate?, the answer leads us back to exposure. If exposure is low, risk will also be low. In the final analysis, this means that there’s no good reason to stop using glyphosate whether it’s a carcinogen or not.

Joel Trumbo is a Senior Environmental Scientist with the California Department of Fish and Wildlife. Joel has been the statewide Integrated Pest Management Coordinator for CDFW since 1990. Contact him at Joel.Trumbo@wildlife.ca.gov.

Is it just me, or is puncturevine everywhere this year?

By Jennifer Gibson, Ecologist, Whiskeytown National Recreation Area

Yes, puncturevine (*Tribulus terrestris*), a.k.a. “goat head” or “caltrop” (or “scourge of summer” by kids on bikes everywhere because the thorny seed heads puncture bike tires with ease). The name “caltrop” comes from the spiked metal devices designed to impede advancing armies in medieval times. Besides injury, the burs can also be toxic to sheep and cattle, causing nitrate poisoning.

This summer, when I went running on the same trails I’ve run on since high school in my favorite Bay Area park – Sycamore Grove near Livermore – there it was, crawling onto park property from an adjacent vineyard in giant sprawling mats. I know this plant well. We’ve been treating a well-established population up at Whiskeytown National Recreation Area where I work in northern California for ten years now, and it takes back-to-back treatments (sometimes 5-6 mechanical and chemical treatments) and monitoring every summer to keep it from going to seed. And now I find carpets of the stuff moving into my favorite park in the Bay Area! It’s in the horse trailer parking lot where people unload saddles, blankets and gear; the main parking lot with strollers, bikes, dogs, and little kids; and radiating out from these areas along trails.

What’s worse is that when I drove back to Shasta County, I found it everywhere as well; in front of the Volunteer Fire Department, around the elementary school’s soccer field, on paths at the State Historic Park, and at the new open space dog park along the Sacramento River. I even found new infestations popping up at trailheads and developed areas in my park. And you know that the seeds are hitching a ride on visitors to these sites back to people’s backyards, neighborhoods, and other uninfested parks and recreation areas.

I had to ask myself, “Has it always been like this? Is anyone tracking puncturevine? How did it get so out of hand?”

The good news is that it is a poor

competitor and not a prolific seed producer, when compared to other noxious weeds. And, new infestations can be easily controlled by hand pulling before the burs begin to form. Other suggestions for control include planting vegetation that can out-compete puncturevine.

The bad news is that it seems to thrive in drought conditions, which may be why it appears to be spreading throughout California the past few years. And the other bit of bad news is that I spoke with several parks affected by this plant and even though this species can be relatively easy to treat, most land managers are woefully underfunded and understaffed to tackle this unanticipated problem.

On the lighter side, online searches were entertaining. You can buy “Ouchless Faux-Paws” to protect your pet’s feet from puncturevine. In Oregon, you can buy puncturevine weevils to use as biocontrol (for every 10 units of weevils purchased, you get a free 1964 silver Kennedy half-dollar!) There’s “I Hate Goat Head” apparel, videos, rants from bicyclists, volunteer work weekends and even bounties placed on each garbage bag stuffed with dead plants. It’s a relief to know that I’m not alone – this plant is universally hated.

However, even though puncturevine is C-rated by the California Department of Food and Agriculture, it is not listed in the Cal-IPC Online Inventory – mostly

because it is not common in wildlands and is more typically found in urban or agricultural areas and roadsides. I have to agree with this - I don’t see this plant adversely affecting native biodiversity in wildlands. But I do see it in parks and open spaces. So, as a land manager of a National Recreation Area that’s focused on preserving and protecting native plant communities while also promoting hiking, biking and positive visitor experience, it is at the top of my “Most Wanted” list of weeds to manage.

Would a Cal-IPC listing help? I think so. The more public outreach and education, the better. The Online Inventory is not just for land managers and academics; it is used by volunteers, planners, and concerned citizens. Providing an assessment of the ecological impacts of puncturevine would help managers control the species and help the public understand how to prevent spread. And the good news is that even though getting this plant under control is a lot of work, I think it can be done. Particularly if we can treat the parks and recreation areas where the seeds are most likely to adhere to little kids’ shoes, bike tires and paws, and then later be dispersed and spread elsewhere. And if Cal-IPC needs a universally-hated plant to rally support for common cause amongst diverse user groups – then puncturevine is definitely our plant!

The best thing about this story is that after I drafted this article, I found myself back on the running trails at Sycamore Grove and I did not see a single puncturevine plant. Zero. Nada. I was beginning to think I imagined the thousands of plants sprawling out from the parking lot and along the roads and trails. I emailed the park and found out that yes, the plant really exploded on them this year, but park staff and volunteers to hand pull it throughout the park. So, it is possible to get a handle on it! I know there needs to be follow-up, but congratulations to Sycamore Grove for setting the example and taking care of their park!



Scotch broom gall mite: a new partner in broom management

By Scott Oneto, Farm Advisor, UC Cooperative Extension, Central Sierra

A recent find in El Dorado County has weed scientists, land managers, foresters, botanists, and plant conservationists throughout Northern California very excited over a tiny mite.

The broom gall mite has recently been observed attacking the invasive plant Scotch broom (*Cytisus scoparius*) in California's natural landscapes. Scotch broom, desired for its bright yellow flowers and rapid growth, was first introduced into North America as an ornamental and for erosion control. However, its ability to outcompete native plants and form dense stands has also made it one of California's worst wildland weeds.

The mites cause galls, small abnormal growths on the plant's buds, to form during feeding, greatly reducing Scotch broom's ability to grow and reproduce. This mite is considered to be an ideal biological control agent due to its specialized feeding habits and the debilitating damage it can cause to invasive weeds. In some areas, the gall mite has already killed large stands of broom.

The mighty mite

The Scotch broom gall mite, more closely related to spiders and ticks than insects, is a type of eriophyid mite that is nearly invisible to the naked eye, measuring roughly the width of a human hair. Although the mite is tiny, the galls formed by plants in response to the mite's feeding are quite noticeable. The small fuzzy masses occur along the length of the stem and can be numerous.

Native to Europe, the mite was first found on Scotch broom in the Tacoma, Washington, and Portland, Oregon, regions in 2005. (It was not introduced as a formal biocontrol, and how it got there remains a mystery.) Since that time the mite has become established throughout western Washington and Oregon and even into parts of British Columbia. The mite is very host-specific and has not been found on other broom species, such as

French or Spanish broom. Up until 2013, the mite had only been found as far south as Ashland, Oregon, with no occurrences in California.

However in March 2014, a landowner in El Dorado County brought a sickly looking Scotch broom plant to the local U.S. Forest Service (USFS) office to examine small growths on the branches. Farm advisors in the University of California Cooperative Extension's (UCCE) El Dorado County office have been monitoring this mite's spread throughout the Pacific Northwest for the past few years and identified the sample as a potential gall mite.

Since the first detection in El Dorado County, USFS, UCCE, and the California Department of Food and Agriculture have been on the lookout for other occurrences of the gall mite on Scotch broom. Surprisingly, the mite has since been found in many areas throughout El Dorado, Placer, and Nevada counties; but how it got there is a mystery. Mites are known to travel long distances using wind currents and by hitching rides on animals, humans and equipment. It is likely that many more finds will be forthcoming.

Scotch broom currently infests millions of acres throughout California, causing loss of native plant biodiversity and an increased fire risk. The USFS

and other agencies spend a considerable amount of time and taxpayer money each year treating Scotch broom plants either



Galls on scotch broom. Photo by Scott Oneto.

by applying herbicides or prying them up by the root. With the mites' help, we'll make much greater progress toward reducing Scotch broom infestations.

Help us track the spread of this beneficial mite. If you see evidence of Scotch broom gall mites, report it on the UC Cooperative Extension website: ucanr.edu/broomgallmite.

For more information about Scotch broom and other brooms, read UC IPM's Pest Note: Brooms at www.ipm.ucdavis.edu/PMG/PESTNOTES/pn74147.html. Contact Scott at sroneto@ucanr.edu.



Might wood rats be allies in broom management?

In Marin County's oak-bay-madrone forests, it's common to see sizable wood rat middens, the piles of sticks and leaves they build to live in, near stands of mature French broom (photo below). Broom growing near these middens often has bark missing around the base of the stems and on parts of the upper stems as a result of herbivory (photo at left). While the bark removal does not appear to kill the plants, it does appear to weaken them and could potentially cause mortality in conjunction with other factors, particularly intense sunlight and drought. In addition, some mature broom stands have very few seedlings. Might wood rats be consuming a significant portion of the seed bank? This may be a question worth researching.

-Paul Minault



Dredging for Hydrilla tubers

Hydrilla verticillata is one of the world's worst aquatic weeds. Introduced into Florida from Sri Lanka through the aquarium trade in the 1950s or 1960s, it had infested 100,000 acres by 1994 with presence in 80% of the state's lakes and rivers. The plant is now actively managed by the Florida Fish & Wildlife Conservation Commission at a cost of \$20-35 million each year.

Hydrilla grows quickly, doubling size in 2 weeks, and it spreads easily through fragments and tubers, which can survive for 4-7 years in sediments where they are hard to reach. Besides the aquarium trade, the plant can be introduced via infested water lily bulbs and warm-water fish stocking. USDA has listed hydrilla as a federal noxious weed.

In California, hydrilla first appeared in 1976 in Yuba County. It has also been found in Clear Lake, a major recreational boating destination. In partnership with the California Dept. of Water Resources, the California Dept. of Food and Agriculture (CDEA) maintains a program working to eradicate hydrilla from the state. Clear Lake is a primary target because of its proximity to the Delta, but ditches in Yuba County remains an important front because spread could impede agricultural irrigation. Small-scale mining equipment is used to dredge for tubers (right), and then irrigation channels are lined with concrete.

-David Kratville, CDEA



Hawai'i: Ground zero for plant invasions - and EMAPi13!

By Gina Darin, California Department of Water Resources and Dana Morawitz, Cal-IPC

Thirty-four countries from around the world were represented by 200 researchers, land managers, government representatives, and students on the Big

ready for the challenge. Dave Richardson of South Africa summarized reality best when he suggested that “the global trans-plant experiment has only just begun”.



Gina and invasive “toilet bowl ginger.” Land managers gave it this name to make the plant seem unappealing.

Island of Hawai'i this past September for the 13th international conference on the Ecology and Management of Alien Plant Invasions (EMAPi13). Presenters included three Cal-IPC Board members—Jennifer Funk of Chapman University, Elise Gornish of UC Davis, and Gina Darin of the California Department of Water Resources—as well as Cal-IPC Program Manager Dana Morawitz.

Program session topics ranged from the biology and ecology of invasive plants to policy and management, and focused mainly on environmental weed issues, though some agricultural weeds were addressed too. It seemed like an international Cal-IPC Symposium! Several key themes throughout the conference were:

Global trends – Mark van Kleunen from Germany delivered a talk on “Plant naturalization: From global patterns to regional and local drivers.” Regan Early from the UK covered global prediction models and assessments of which countries’ policies and funding levels were

ers, such as hawkweed (*Hieracium* spp.), in remote mountainous areas of her district. Leveraging biocontrol was the subject of many presentations.

Invasions on Hawai'i – Peter Vitousek from Stanford University presented on “Plant invasions and their ecosystem-level consequences across environmental gradients” using Hawai'i as a key example. Rhonda Loh, an ecologist for the Hawai'i Volcanoes National Park, discussed how the park prioritizes sites and sets goals to conserve some of every sensitive habitat type in the park.

Work smarter, not harder – Kat Shea from Penn State University demonstrated how understanding disturbance regimes leads to more efficient management. Hillary Cherry from Australia talked about incipient attempts to use dogs and drones to survey for barely detectable invad-

Abstracts may be found at www.emapi2015.hawaii-conference.com/program.

The field trip to Hawai'i Volcanoes National Park included a behind-the-scenes look at invasive plant strategies and the US Forest Service biocontrol quarantine lab in the park. We saw demonstrations of how hard it is to remove dense stands of *Hedychium gardnerianum* or “toiletbrush ginger” (renamed from “Kahili ginger” to give it a non-Hawaiian name with a negative connotation) and the impacts it is having on the native Ohia forest.

The next EMAPi conference, EMAPi14, will be hosted by the University of Lisbon in Portugal in September of 2017.



Water hyacinth fills a pond at Punalu'u Black Sand Beach.

Habitat conservation planning and weed management

As part of the Symposium, Cal-IPC hosted a conference track exploring connections between habitat conservation plans (HCPs) and landscape-level invasive plant management. Planning experts from federal and state agencies joined land managers in exploring ideas for strengthening the connection in the future.

HCPs are regional plans that balance development with conservation. HCP funding is being put toward invasive plant management, and as more HCPs get created, more invasive plant management work can be implemented at the landscape-level. HCPs pay for protection of listed species by tapping sources such as fees on developers, tipping fees for landfills, and fees for regional infrastructure build-out. The new HCP in Santa Clara County is funded in part by fees based on nitrogen deposition from vehicle and power plant exhaust (which promotes invasive plants in endangered butterfly habitat).

Some funding is available from agencies. In California, once an area has established a Natural Areas Conservation Plan (NCCP), the Dept. of Fish & Wildlife has local assistance grants

available to support activities including planning invasive plant control. Caltrans provides advance mitigation funds for future highway construction. At the federal level, the US Fish & Wildlife Service supports the Endangered Species Act through grants for local planning and land acquisition work; it may also be able to fund implementation of key stewardship projects like invasive plant control.

Habitat conservation planning is driven by local needs for both conservation and development, so it's a situation-specific process. However, there are efforts to standardize and streamline aspects of the process. A national coalition of HCP partners recently formed to support conservation work across the country. Here in California, the state's Biodiversity Council (comprising all state and federal agencies that touch on biodiversity) approved an "Integrated Regional Conservation and Development" planning approach. This IRCD approach has a goal of mapping critical resources and determining regional conservation priorities across the entire state in advance of setting up plans to balance conservation and development.

Managers controlling invasive plants on behalf of an HCP/NCCP have

developed successful strategies including:

- Maintaining a right-of-entry database for private property where weed populations have been treated.
- Testing treatment efficacy before scaling up to larger projects.
- Removing populations of weed species that are a significant threat to spread even when they are not (yet) located in prime habitat for covered species.
- Using helicopter surveys to map weeds efficiently over large areas.
- Engaging volunteer weed spotters as part of an early detection program.
- Tracking restoration work in an online database to provide a historic view.
- Preparing response actions to be used immediately after a wildfire, both to keep weeds from spreading and to take advantage of opportunities for weed control.

Overall there was broad agreement at the conference that many aspects of landscape-level invasive plant management – BMPs, prioritization, partner coordination – are a great fit for habitat conservation planning. We look forward to continuing this important discussion.



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The WILDLAND WEED CALENDAR

California Weed Science Society

January 13-15, Sacramento
www.cwss.org

California Rangeland Summit

January 21-22, Stockton
www.carangeland.org

Tamarisk Coalition

February 9-11, Grand Junction, CO
www.tamariskcoalition.org

Western Society of Weed Science

March 7-10, Albuquerque, NM
www.wsweedscience.org

Rare Plant Survey Protocols

March 14-15, Oxnard
www.cnps.org/workshops

Measuring & Monitoring Rare Plant Populations

April 4-6, Zzyzx
www.cnps.org/workshops

SERCAL

May 11-13, Kings Beach
www.sercal.org

California Invasive Species Action Week

June 4-12, statewide
www.wildlife.ca.gov/Conservation/Invasives/Action-Week

Natural Areas Conference

October 21-22, Davis
www.naturalareas.org

Cal-IPC 2016 Symposium

November 2-5, Tenaya Lodge, Yosemite
www.cal-ipc.org

“Landscape-level conservation is hope-propelled rather than fear-accelerated. It’s a banding together in the face of grave environmental threats of extinctions and degradation whose alchemy is that, by widening our horizons, the focus isn’t so much on salvage operations as on the astounding number of things that can and need to be undertaken to restore, replenish, safeguard, protect, and celebrate the long-term integrity of this gigantic continent’s astonishing natural and cultural heritage.”

~ Tony Hiss, from the Forward to Expanding Horizons: Highlights from the National Workshop on Large Landscape Conservation, Washington DC, Oct. 2014. www.largelandscapenetwork.org.